THE ELECTRICAL WORLD

VOL. III.—No 4. NEW YORK, JANUARY 26, 1884. $2 PER ANNUM. 5 CENTS A COPY.

## Steam Engines for Driving Dynamo-Electric Machines.

II.

THE IDE ENGINE.

In a previous article we analyzed the requirements of steamengines adapted to driving dynamo-electric machines. We showed the importance of even and uniform rotation; we emphasized the necessity of delicate and accurate regulation; and we showed the peculiarities of design and of construction which these qualities prescribe. After thus reviewing the conditions of success, and pointing out the direction in which the mechanical engineer must exert his genius as inventor or apply his skill as mechanic in order to produce an efficient, economical, reliable engine, we entered on our task of studying the distinguishing features and merits of the various types of engines suitable for driving dynamo-electric machines, selecting as our first example a well-known type of high-speed engine specially designed for electric light purposes.

We shall resume our task now by bringing to the attention of our readers another type of high-speed engine specially adapted to driving dynamo-electric machines—the Ide engine, manufactured by A. L. Ide, at Springfield, Illinois—which presents special features of great interest, and whose successful operation in electric lighting installations has attracted the attention of electricians for some time past. The design of a steam engine, like the design of a dynamo-electric machine, admits of almost endless modification, though in the case of both it is far from being a fact that each design proves practical. Out of the great variety presented there are only a few which have proved satisfactory in practice, and these generally serve as models for the designer. Evidently the aim of a good design should be to combine the best qualities of all these prototypes and to avoid their defects—to adopt the good and to reject the bad from each. This is what the design of the Ide engine aims at.

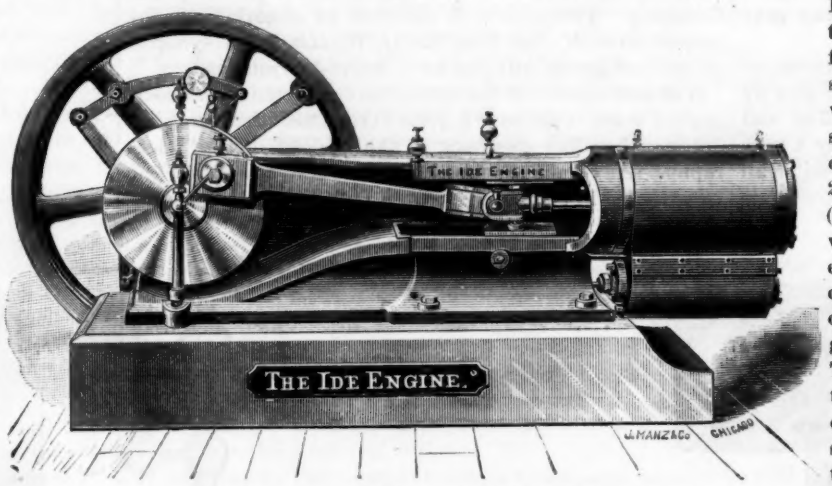



FIG. 1.—FRONT OF ENGINE.

Fig. 1 shows the front side of this engine resting on its foundation. Fig. 2 is a larger view of the other side of the engine, showing the valve gear, regulating mechanism and the bearing on which rests the outer end of the shaft. It is seen that this engine has a curved bed plate, overhung cylinder and a disc crank, while the regulating mechanism is carried by a balance wheel on the crank shaft. These are all features which we find embodied in the best known and most successful engines of this class. On close study of the details, however, we shall find many new features which possess considerable merit and which indicate that every point has been studied with care, so that the most satisfactory device or arrangement might be adapted to the performance of each function.

The bed and frame of an engine constitute its real skeleton, which serves as the foundation and the support for the other parts of the engine. It is this very skeleton, too, which has to withstand the strains produced by reciprocating parts that tend to push or pull, bend or spring, and the shocks and jars that tend to displace it and cause imperfect working. Much depends, therefore, on the aptness and perfection of its design. In order to secure solidity and stability of foundation, stiffness and strength of frame, and withal simplicity of construction, the questions of form, structure and proportions should receive careful consideration.

In the design of the bed and frame of his engine Mr. Ide has accepted the good features characterizing the most approved types of engine beds and frames. Thus the design as seen on the disc side (Fig. 1) suggests a resemblance to some well-known engines; but in reality, however, some important modifications have been introduced, for, as seen on the valve-gear side (Fig. 2), or looking down upon the engine from above (Fig. 3), it seems quite novel. This design, in which Mr. Ide has sought to supplement the experience of others with his own, is, in our opinion quite satisfactory. The lower portion, or base, forms a kind of hollow platform, or box girder, which is the foundation of the engine. This box girder, which is cross ribbed underneath to increase its strength, slopes down at the shaft end to leave room for the crank disc, as plainly shown in Fig. 1. It extends the full length of the engine bed, and the upper surface of its highest portion, at the cylinder end, forms the guide for the lower slide of the cross-head. The upper slide is formed in the top portion of the frame, which is united with the bed-plate or girder-box by a vertical plate or web, which passes straight from the cylinder end of the frame to the shaft bearing. It merges into this bearing at its inner margin close to the crank disc, as seen in Fig. 3, where the white dotted lines show the continuation of this vertical web under the top plate to come to the pillow block. Thus we see that the frame proper is a shell of cast-iron whose form suggests a cylinder divided lengthwise, or from which one half has been removed. The top plate i

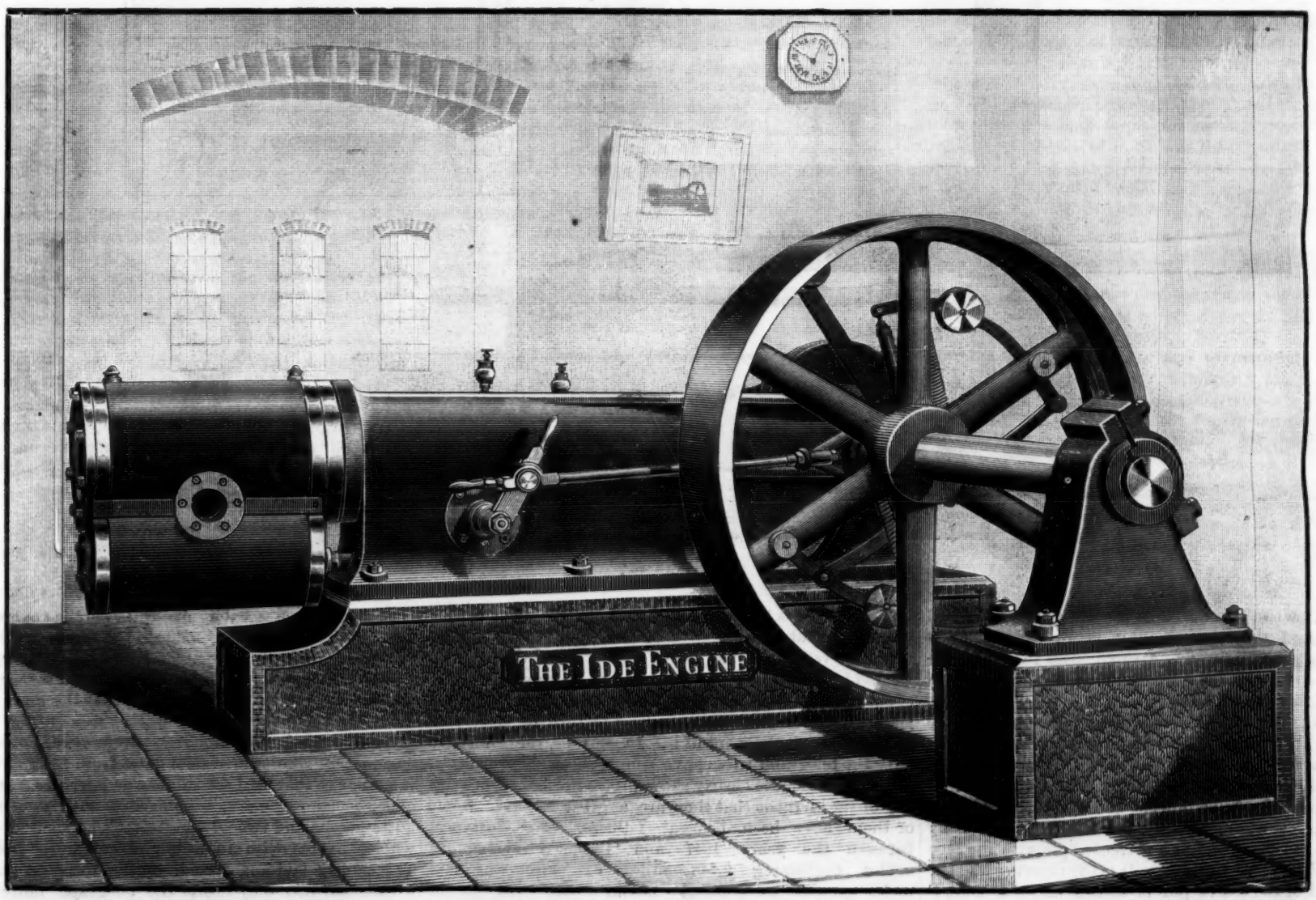



FIG. 2.—VIEW OF ENGINE SHOWING VALVE GEAR, ETC.

flat and extends horizontally from the cylinder end to the bearing, as shown in Fig. 2. When seen from the top, however (Fig. 3), it appears that it has a kind of S shaped curvature sidewise, as if to make room for the crank disc and also to strengthen the bearing for the shaft. It is of the full width of the pillow block, as seen in the figure. Its outer margin forms a projecting rib near the pillow block, as shown in Fig. 2.

The vertical or web portion of the frame evidently prevents all tendency of the bed to yield by springing or bending up and down. It also strengthens the main bearing, especially that portion near the crank disc where the strain is naturally greater. The top plate, on the other hand, acts as a girder to the vertical web, and prevents all yielding or springing side which is frequently the source of heat at the bearings, especially when the engine is working under a heavy load. But heat is avoided by other precautions also; the bearings are made ample. Moreover the caps on the bearings instead of being placed horizontally, as ordinarily the case, are placed at an angle. The cap on the outer bearing in Fig 2 shows this plainly. By this arrangement, the greatest wear of the bearings, which are babbitted, is no longer in a line with the separation between the cap and the bearing, but in a line nearly at right angle thereto, and the adjustment of the cap may be effected more readily and perfectly.

The shaft is of forged steel and of a good diameter, so as to stand heavy strains without springing. In Fig. 4 we have a section of the bed through the crank disc and shaft which shows that the disc is overhung only a very little. This is of course to obviate as much as possible all lateral strain. For the same purpose and also to obviate "thumping," when the bearings are loose, the flywheel itself is placed near to the main bearing; in fact, as near as was possible, leaving a small space for the thickness of the eccentric and its connections with the automatic regulator mechanism.

The crank disc, made from hard charcoal iron, is bored and forced on the shaft by hydraulic pressure, like a car-wheel on its axle, and then keyed on. The crank pin, which is of soft steel, with hardened surface, is fitted on after this operation is completed and not before, the object being to make sure that the pin is exactly and truly in line with the shaft, and at a perfect angle with the face of the disc. The hole in the disc is made tapering and the tapering end of the crank pin is forced into this hole, it being secured in place by a nut screwed on its threaded extremity. This mode of assemblage allows the pin to be readily removed if it should become cut, and ground smooth or else replaced by a new one.

The device for oiling the crank-pin bearing is very ingenious, as seen in Fig. 4. The outer end of the crank pin is hollow. This cavity connects by a brass tube with a hollow ball, that revolves on the same geometrical axis as the shaft when the engine moves, and which appears to be suspended in the air. Into this ball the oil is delivered from a visible feed oiler. It is easy to understand that this oil becomes conveyed into the cavity in the crank-pin, and that from this it lubricates the pin-bearing by passing through small holes in the pin. ***

(TO BE CONTINUED.)

## The Question of Underground Wires.

Of late the attention of the public has been very much taken up with the question of the desirability of putting all electrical wires under ground, and as might be expected the public has been very much led astray by the misrepresentations of those who for various reasons are interested in seeing aerial wires become subterranean. The absurdity of the charges brought against the aerial arc light wires in New York has been so recently exposed that there is no need to go over them again now, but that case may be taken as very largely typical of the manner in which prejudice against wires overhead has been implanted and cultivated.

Any one who will take the trouble to present a fair, dispassionate statement of the difficulties in the way of running the wires underground, while admitting all that can be said with justice against the methods that now prevail in this country of carrying the wires on poles that are often unsightly and of leading them from housetop to housetop, does a public service; and we are glad to direct attention to certain facts admirably presented in the latest number of the *Popular Science Monthly*, by Dr. William W. Jacques, Electrician of the American Bell Telephone Company. This article is referred to editorially in the present issue of THE ELECTRICAL WORLD, but a synopsis of its chief points will also be of interest to our readers.

A demonstration of the difficulties connected with underground wires must be to a great extent historical, and Dr. Jacques therefore goes back to the earliest days of telegraphy. He recalls the fact that the first telegraph line constructed in this country, from Baltimore to Washington, in 1843, was laid underground for a distance of nine miles, and that that method was then found useless. Since that time very little has been done to put wires under ground in this country, and European visitors have long commented on the big poles and the wires in the streets of all our towns and cities as one great feature of American civilization—or the want of it. In Europe, the efforts to bury the telegraph wires have simply been innumerable, but, as Dr. Jacques clearly shows, it cannot be claimed for any of the methods that they are a great success. Some of them have been colossal failures. For instance, between the years 1847 and 1850, a system of cables containing 2,648 miles of wire was laid under ground to connect Berlin with the other principal cities of Germany. In trenches two feet deep leaden tubes were buried, containing gutta-percha-covered wires. This system cost about ten times as much as that of good overhead lines, but by 1853 it was entirely superseded by the latter. Similar failure attended the laying of a cable between St. Petersburg and Moscow a few years later; several cables in France, outside Paris, failed; lead-covered cables in Denmark were soon abandoned, and various attempts in England were blessed with no better luck. In most cases the trouble was due to water, or else the gutta-percha coating became abraded or was attacked by coal gas, vegetable growths and the constituents of the soil. An attempt made in 1855 by the French government to use bare wires in a trench filled with bituminous compounds would not answer satisfactorily, although the cost was ten times that of a good pole line, and the system was abandoned. In 1858 the government went back to gutta-percha-covered cables laid in leaden tubes, the reason being that some of these cables laid in the sewers of Paris as far back as 1846 had remained in good condition. Dr. Jacques says:

"Many miles of this cable were laid, some with the lead pipe laid directly in the earth, some with it drawn again into iron pipes, and some carried through the sewers of the principal cities. Those cables laid directly in the earth soon failed, but those in iron pipes and the sewers continued to work, and from this grew the system now used in Paris. Up to 1870 the above-described attempts, as well as many others (not recounted), had proved a series of complete failures. Since that, however, several lines have been built in England that have continued to work successfully; and in Germany successful underground cables have been laid down connecting together all of the principal cities of the empire. The present complete system, as used between Liverpool and Manchester, was constructed as follows: Iron or stoneware pipes were laid from one to two feet below the level of the road side with flush-boxes coming to the surface every 200 yards. Into these was drawn a cable of gutta-percha-covered wires. The joints were carefully made in the pipes, and they were smoothed inside to prevent any possible abrading of the cable. The route was especially selected through a low and marshy section of country, so that the pipes were almost constantly filled with water this being the best possible condition for the preservation of the gutta percha. The present European system dates from 1875. The cable is similar to that used for submarine purposes. It consists of seven copper wires, each coated with two layers of gutta percha and two of Chatterton's compound, and the whole covered with an armor of galvanized iron wires. This cable is laid in a trench by the roadside, and comes to the surface only inside the telegraph offices in the cities. Its cost was nearly twenty times the cost of a well-built pole line."

It will be noticed that what has been cited above has to do only with telegraphy, except that in Paris *all* the wires are carried underground, necessitating a costly service for telephones, and with a disastrous effect in diminishing the patronage of the electric light, as remarked by Prof. Morton in his recent letter on the subject to the New York *Times*. The telephone wires in Paris are metallic circuits, so that there is little ill effect from induction and retardation; but the expense is of course greatly increased.

A general survey of Europe shows that in London the telegraph wires run underground from the central office to many of the branch offices and to the railways, along whose tracks the telegraph lines may generally be

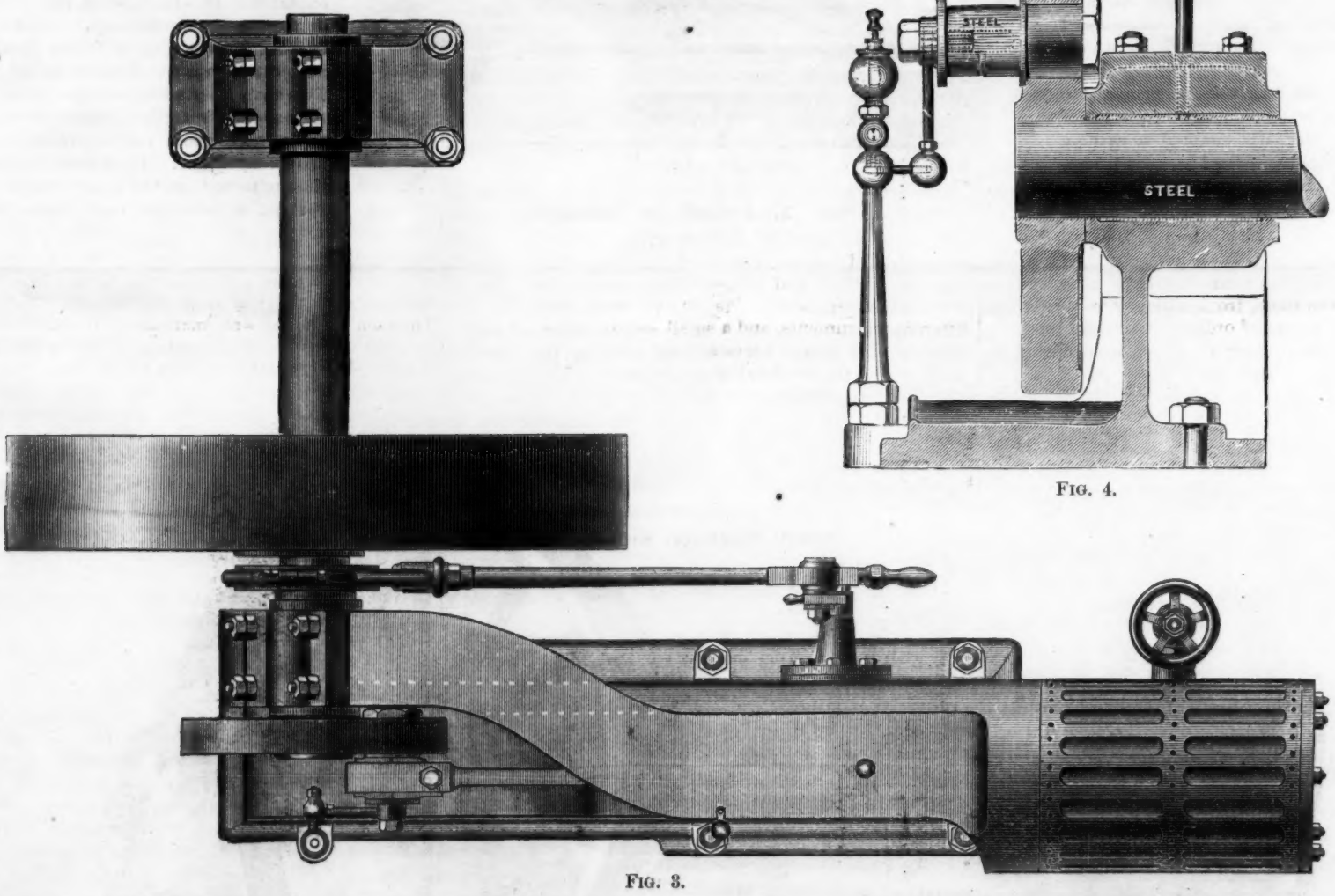



FIG. 4.

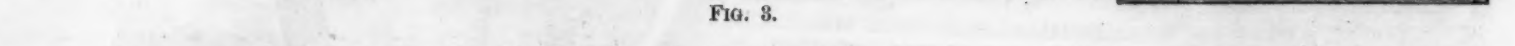


FIG. 3.

seen in the open country. In Vienna, Prague, Brunn, Munich, Augsburg, Nuremberg and many other continental cities, the telegraph wires are carried under ground by by armored cables to the outside of each city, and this, too, is the case with many of the German cities. But telephone wires, electric light wires, and thousands of miles of telegraph wire are in the European cities and towns, generally carried, as in this country, on poles or on the roofs. As to the telegraph lines, Dr. Jacques, says significantly: "Although both the English and the German systems are successfully working lines of telegraph, they are far less efficient than pole lines of the same length. The speed of working even the ordinary instruments is limited; serious trouble appears in attempting to use fast working machines, or automatic senders, and the use of the telephone is impossible." Americans do not want slower telegraphy than they have now,

Naturally Dr. Jacques pays special attention to the subject in its bearings on telephony with its feeble current and easily affected instruments, and he gives the following account of important experiments made by the Bell Company, in Boston.

"The American Bell Telephone Company has recently constructed two short lines of underground wires in the business section of Boston, and these give us excellent data from which to judge of the extent of technical practicability and the expense of putting all wires underground. We have seen that in Paris the retardation and induction are both obviated by the use of double and twisted wires in metallic circuit. It is necessary that *all* of the wires be in metallic circuit; for, if a metallic circuit be connected to a single-line circuit, the disturbances are not removed. If a subscriber in one city wishes to talk with a subscriber in a neighboring city, both cities must have metallic circuit systems and metallic circuits between the two cities. As the two lines constructed in Boston are short, only about one-quarter of a mile each, it was deemed best to use single-line circuits, hoping that the induction and retardation on so short lines would not be serious.

The system is constructed as follows: Eight wrought iron pipes, three inches in diameter, are laid side by side in two rows, about four feet below the surface. At each street corner is built a brick chamber, large enough to admit a man, and with a cover flush with the street. The cables, of which several kinds are in use, run out from the basement of the central office through these pipes and up the side of buildings to roofs, from which they spread out to the subscribers by means of ordinary overhead lines.

Conversation over these lines is not so easily carried on as by means of overhead wires, and it is frequently possible to overhear other conversation. This prohibits further extension of the single-wire system underground, for technical reasons. The cost of the piping and chambers is in round numbers $50,000 per mile, and these pipes are intended to accommodate one thousand wires. The cost of the cables is from $60 to $150 per mile for each circuit, according to the kind of cable used.

In round numbers we may estimate the total cost for one thousand wires at $150,000 per mile, or $150 per mile per circuit. The cost of piping and chambers would be nearly as great for one hundred circuits as for one thousand, as the cost of chambers and the labor of excavating and filling would be the same; so that the cost for one hundred wires may be estimated at $50,000 per mile, or $500 per mile per conductor. The cost per conductor thus increases enormously as the number of conductors diminishes, so that it would be clearly impossible to follow out the wires of an exchange system in all of their bifurcations."

## A Uniform Standard of Electrical Resistance.

It will be remembered that in order to hasten and facilitate the adoption of a satisfactory standard of electrical resistance, the International Committee on Electrical Units, at the meeting at Paris, in November, 1882, decided that when the length of a column of pure mercury of one square millimetre section, and having a resistance of one ohm, shall have been determined to within one part in a thousand, the ohm shall then be defined as the resistance of such a column of fine mercury of the determined length.

In order that experiments might be conducted in this country for accurately determining the length, an appropriation of $12,500 was made by the last Congress. The work has been entrusted to the able hands of Prof. Rowland, of the Johns Hopkins University, and is expected to be finished by next September. Its progress is thus described by *Science* in a recent issue:

The experiments are being carried on in Baltimore, both at the university and at Clifton Park, two miles from the city. Owing to some unexpected delays in the construction of necessary apparatus, the work that has been undertaken first is the determination of the specific resistance of mercury in British Association units. This has been experimented upon by measuring the resistance of columns of pure mercury contained in glass tubes of various calibers and lengths, so that the resistances of the columns experimented upon range from one to ten British Association units. The remaining part of the work is the determination in ohms of the resistance of the British Association standard used in this determination of the specific resistance of mercury. Two principal methods will be employed for this purpose. First, the resistance will be found by means of the mechanical equivalent of heat. The apparatus used by Professor Rowland in his well-known work on that subject has been set up for this purpose. It is proposed to heat some non-conducting liquid, such as alcohol or turpentine, by means of the heat developed by the passage of the current of electricity in a conductor whose extremities are kept at a known difference of potential. The same heating will then be produced, under the same circumstances, by purely mechanical means; and the resistance of the conductor will thus be determined directly from the work-equivalent of the heat developed in the conductor. The second method to be used is that of Kirchoff, as modified by Rowland in his determination of the ohm in 1876. The instruments will, however, be in large part new, and constructed expressly for this research, so that a new set of instrumental constants will be involved. A third method, the earth-inductor method of Weber, will also be used if time permits.

For these experiments it is proposed to use, as a source of electricity in the calorimetric method, fifty Planté cells charged by a small dynamo machine. For measuring large currents of electricity an electro-dynamometer has been constructed, with the Helmholtz arrangement of two large coils and a single small suspended coil. The diameter of the large coils is about one metre; that of the small suspended coil about twenty-five centimetres. There are two sets of large coils—one wound with large wire, about No. 8, and the other with much smaller, about No. 15. There are also two small suspended coils wound to correspond. This arrangement gives the instrument great power and range. The divided circle was made by Fauth & Co. expressly for this instrument. Four induction-coils are to be wound in four parallel equidistant grooves, turned on the outside of a brass cylinder about one metre in diameter. These coils will each consist of about two hundred turns of No. 15 copper wire. This arrangement will afford great variety in the manner in which the several coils may be combined; for the inductive action of each coil upon each of the others may be taken, giving three simple combinations for each coil.

The trustees of the Johns Hopkins University have kindly placed the Clifton House at Professor Rowland's disposal for the conduct of these experiments; and, as it stands in extensive grounds at a considerable distance from the road, it will be peculiarly suitable for delicate electrical experiments. Piers have been built for the different instruments, and a small steam-engine set up for supplying the power necessary for running the dynamo machine and the mechanical equivalent of heat apparatus. The actual experimentation will be carried on, under Professor Rowland's direction, by A. L. Kimball, assisted by H. R. Goodnow and Ensign Louis Duncan, U. S. N.; the latter having been specially detailed for the work by the Navy department.

## Buffalo Electrical Society.

At the meeting of the above society on the 18th inst. Professor Finn delivered a lecture in the form of a regular review of previous papers read by him. This was supplemented by a series of interesting and beautiful elementary experiments, illustrated by the aid of a large collection of electrical apparatus. The singing telephone was also introduced, Harvey D. Reynolds being the singer. He was stationed in a distant part of the building, and, by an arrangement of electric buttons, the music was instantly transferred from one portion of the hall to another, where telephones were placed, giving it the effect of a weird species of ventriloquism. Upon his reappearance in the hall Mr. Reynolds was greeted with a hearty round of applause. The society is rapidly adding to its resources in electrical appliances, and its meetings are becoming of more and more absorbing interest. At its next meeting A. C. Terry, wire chief of the Western Union office, will lecture upon the workings of the switchboard and the methods used in discovering crosses and other interruptions of the working of the wires. Mr. Terry is an experienced and able expert in this particular branch of electrical science, and his teaching will be of value. Prof. Finn will lecture as usual with an additional supply of electrical novelties.

## Turning it on our Statesmen.

The electric light is now a familiar sight in Washington, where, owing to the number of fine public buildings brought together within a small area and the picturesque unevenness of the whole District of Columbia, peculiar facilities are afforded for its effective display. The United States Co. appears to be doing good work, and has a fine station at the rear of the *National Republican* office. A reporter of that journal dropped in on the General Manager, Mr. A. M. Renshaw, the other day, when the following remarks passed:

"I observe," said the reporter, addressing the manager, "that you have made some additions to the station."

"Yes," was the reply, "we have recently enlarged the station by adding a new engine, boiler and several dynamos. We have power now for nearly two hundred arc lights, besides several hundred incandescent lights. The latter we propose to furnish the government departments with a day circuit."

"Do your lines extend to all the important points in the city?" asked the reporter.

"Yes," replied Mr. Renshaw, "they embrace nearly all the principal business avenues. We reach the capitol, government printing office, interior department, post-office department, treasury, presidential mansion, war and navy departments, the depots, markets and all the principal hotels of the city."

We notice that Mr. Renshaw also gave the reporter some good points about the difficulties connected with underground wires. It is a pity there is not more of such sensible talk made public. He closed the conversation with the remark: "Any company that puts down underground conduits upon an extensive scale at the present time will commit a most fatal error, which may probably result in their losing all they have invested. I do not believe the authorities here would permit or encourage any general tearing up of streets and laying of conduits, which at best must be experimental for a year or two to come."

## The Boston Telephone Exchange.

We mentioned last week the partial destruction by fire of the fine telephone exchange at No. 40 Pearl street, Boston, and then remarked that in a short time the operating room would soon be fit for work again. We were hardly prepared, however, to report that in less than a week Boston was once more enjoying its telephone service just as though nothing had happened. In fact, it may be said the repairs occupied only five days, as the fire occurred on Saturday morning and on Thursday morning after ordinary communication was reopened. The amount of work crowded into that short time was enormous, and the New England Telephone Co. may fairly be credited with having accomplished an unprecedented feat.

As soon as the officers of the company had ascertained the extent of the damage they determined that all the connections between the roof and the operators' tables must be removed and replaced by new cables and covered wire. The manager, Mr. Loren M. Downs, ordered 4,000 feet of 50-wire cables, and about 40 miles of covered wire from the factory of Eugene F. Phillips, of Providence, and as soon as this was received all the available force was engaged in the laborious processes of reconstruction and reconnection The men employed were maintained in reliefs and worked at night with the illumination of two powerful Brush lights. By Monday morning the connections were made for the special wires for calling expresses. A neat and delicate piece of work was the cleansing of the switchboards, all of which the fire had spared, but which had been deluged with water and smothered in flakes of charred wood. Stoves were set up, bricks were heated, the apparatus was dried, and the carbon dust was then blown out of the boards by bellows and a powerful rotary blower. At last the 2,000 wires were all reunited by means of thousands of little repairs and the use of the new wire; and much to the delight and relief of Boston the system was once more in working order.

This praiseworthy result is due to the efforts of Mr. Downs, the manager of the company; Mr. David B. Parker, superintendent of the Boston Division; Mr. John J. Carty, superintendent of the operating-room, and Messrs. Vail, Lockwood and Gilliland. All these gentlemen took an active part in restoring order out of chaos. In rearranging the wires several improvements have been introduced to facilitate tracing the connections, and the lightning arresters, which were formerly in the cupola, have been dispensed with, the wires being carried directly to the pins in the large frame on the roof.

THE Swiss town of Montreux, on the Lake of Geneva, will be the first town entirely lighted by electricity and provided with street cars moved by electricity. A company has already been formed for both undertakings.

"BECAUSE THEIR DEEDS ARE EVIL."—A correspondent of the New York *Times*, at Newark, N. J., writes as follows: "Many complaints having recently appeared in the New York newspapers respecting the beggars, tramps, etc., that nightly infest the southern end of Central Park, rendering it very unsafe at that time, perhaps the experience of Newark with a similar trouble might suggest a remedy. For many years the public parks of Newark, while on the whole of great benefit to the city, have at night been quite the reverse, being overrun by a class of characters that made it extremely unpleasant to pass through them. Notwithstanding the efforts of the police it was impossible to abate this nuisance. Some months ago the city authorities had a number of electric lights placed in Military Park, thinking that they would beautify it and render it attractive to the people. The effect has been remarkable. The park being well lighted, the disreputable characters now carefully avoid it, and the park has been entirely freed from many objectionable features previously existing. The probabilities are that the other public grounds in Newark will hereafter be lighted in the same manner. A like measure would no doubt prove beneficial in Central Park." The same testimony is borne with regard to the parks in Chicago.

THE
# ELECTRICAL WORLD,
PUBLISHED WEEKLY AT
No. 9 MURRAY STREET, NEW YORK.

W. J. JOHNSTON, - Editor and Publisher.

ASSOCIATE EDITORS.

C. O. MAILLOUX, - - - Scientific Department.
T. C. MARTIN, - - - - News Department.
CLARENCE E. STUMP, Business Manager.

Mr. Mailloux, the expert of THE ELECTRICAL WORLD, writes for it exclusively. His articles are designated thus: *.*.

Articles in the preparation of which he has assisted, and the views and statements in which he therefore indorses, are marked, **.

Correspondence on all electrical subjects is solicited. Readers are cordially invited to communicate their views and opinions on all topics within the province of this journal. Items of information relating to any application of electrical science will be thankfully received. Our friends will render us a valuable service by forwarding news *promptly* as it occurs, and by mailing us marked copies of their local papers containing anything likely to interest our readers. Anonymous communications not noticed. Rejected manuscript cannot be returned unless accompanied by the necessary postage when received.

**Correspondence other than of a business nature, should not be addressed to individuals, but solely to**

**"The Editor of The Electrical World, New York."**

All communications relating to subscriptions, book orders, advertising, or of a business nature, should be addressed

W. J. JOHNSTON, Publisher, 9 Murray St. New York.

THE ELECTRICAL WORLD HAS
THE LARGEST CIRCULATION
**Of any Electrical Journal in the World.**

**SUBSCRIPTION, IN ADVANCE, ONE YEAR, $2.00.**

Postage to any part of the United States or Canada is always prepaid by the Publisher. Addresses changed as often as desired free. Always give the **old** as well as the new address.

**ADVERTISING RATES,**

Circulation considered, are lower than those of any similar first-class journal. The price varies according to position and number of insertions.

Notice of Situations or Help Wanted, $1 to $3 per insertion.

**NEW YORK, JANUARY 26, 1884.**

## UNDERGROUND WIRES.

We have elsewhere in the columns of this issue called attention to a paper by Dr. William W. Jacques, electrician of the American Bell Telephone Co., on the burning question, now agitated fully as much in Europe as here, of underground wires. In that paper, some very interesting facts are presented in a very attractive manner, but we think that the conclusion at which any impartial person will arrive after reading it is not one that will favor underground wires very much.

Briefly stated, it is shown that in Europe the underground systems tried have cost from ten to twenty times as much as overhead lines would for the same distance. The systems have been applied almost exclusively to telegraph lines, but even then it is found that polar relays, automatic telegraphs and the like are worked with much greater ease and efficiency over the pole lines than on underground lines. Dr. Jacques is fully supported in his assertion that, for long lines of telegraph, stretching from city to city, here in America, the cheaply built and quickly repaired pole lines, the wires of which are not sensibly affected by retarding influences or by induction, are much better than the underground wires, subject to the slightest effects of electro-static and dynamic induction. Unquestionably, European experience, taken as a whole, is of a saddening, cheerless character, and might be studied with profit by the sanguine visionaries who would be delighted by means of local ordinances or legislative enactments to have every electrical wire in the United States put under ground within the next six months.

We have more than once given it as our opinion that if the various companies concerned in the applications of electricity that require the services of wires knew of any good practicable system of carrying the wires under ground they would adopt it. Now, Dr. Jacques in his paper tells what the American Bell Telephone Company has been doing of its own volition, like some of the other electrical corporations, to ascertain the technical and financial practicability of burying the wires. What is the result? The cost of 1,000 wires, laid in such piping as was used in the experiments, would be no less than $150,000 per mile. That alone would be a serious hindrance to all except the patentees of underground systems and the contractors who build the conduits, but it is not the only objection. According to Dr. Jacques, conversation by means of these test lines is not so easily carried on as by means of wires running overhead all the way, and it is often possible to get snatches of other conversations. And while telephone companies would be discouraged from the adoption of an underground system by this enormous expense, telegraph and electric light companies are not likely to see their way to it any more clearly. Objectionable as, in some respects, overhead wires are, we do not think that the public is prepared to be deprived of cheap, efficient service by compelling the companies to bury their wires, and it is a well ascertained fact that the consumer must in the long run help materially to foot the bill.

Dr. Jacques proposes a compromise as follows:

"It seems to the writer that much of the inconvenience may be obviated, and without greatly increasing the expense, by adopting the following plan: From each telephone exchange, electric-lighting station, or other centre of electric wires, run overhead cables out to a considerable number of points about the city, some one of which would be quite near to each subscriber. From each of these points to the various subscribers run short stretches of ordinary house-top wire. In this way hundreds of single wires would be gathered into small and inoffensive cables, and the enormous wooden structures would be replaced by small cable supports of brick or iron. In no place would there be the offensive multiplicity of wires. Such a system would be more durable, needing fewer repairs than the present, and would not be much more expensive. For any other apparatus than telephones, retardation and induction would not be felt on so short cables. With telephone cables of moderate length, these troubles would not be serious, and, if longer cables were necessary, metallic circuits could be used."

The idea is a good one, though not new. It has, we believe, been tried already with satisfactory results in several cities. It is at any rate more within the bounds of sense and practicability than the others, which grow in costliness as they are successively tried and rejected. After all that is said about following European examples, it must be borne in mind that in Europe the proportion of underground telegraph wires is only six per cent. of all that are in use.

## TELEGRAPHIC ACTIVITY.

Considerable activity prevails in the telegraphic field at present. The Baltimore & Ohio Company is bending its energies to the extension of its system in a manner already indicated in our columns. The National Telegraph Company has been organized to work lines between this city and Chicago, and the Postal Telegraph Co. is pushing ahead, promising to have several new lines ready for business about the middle of February. Then the Bankers and Merchants' Company is displaying enterprise, its most recent achievements being the purchase of the control of the Lehigh Telegraph Co., and, during last week, of the Commercial Telegram Company. Besides all these, the Standard Multiplex Telegraph Company has been incorporated, and we expect to have before long the duty of recording the fact that it has lines in operation East, West, North and South, but beginning East, and that its service to a great extent is superseding or remodeling on a much less expensive basis the present private wire system of telegraphy.

In view of all this it is interesting to observe the course of Western Union affairs. The stock of the Western Union Company has not been quoted very high; indeed, it may be said that the stock has gone lower than at the time of the last marked decline. The stories told of Mr. Gould in this connection are very amusing, and bewildering in their variety. We use the word "amusing" advisedly, as it is reported that Mr. Gould is angry at them and intends to resort to the courts for revenge on those who have uttered malicious falsehoods about his shortness of funds. At any rate, Mr. Gould is credited with having had a "spring opening" of his strong boxes, in order to reassure the public, and to have shown about as much wealth in stock as he did the last time that he was wrought up to this pitch of indignant frankness. The *New York Times*, a journal not particularly noted for its love of Mr. Gould, says of Western Union: "It is abundantly evident that the decline of this stock is causing Mr. Gould more serious embarrassment than the dropping of the Southwestern stocks; for extraordinary efforts are being made to get people to buy it. The latest, and somewhat amusing, trick is the distribution of an advertising circular in which the merits of Western Union are greatly lauded and the immense profits to be made by buying the stock at these prices are duly set forth. This circular seems to have been got out within the past few days, and is understood to have been mailed to everybody whose name and address can be found on the books of such corporations, financial and otherwise, that Mr. Gould's agents could reach."

Be the condition of Western Union what it may, we have collected facts above sufficient to show that its efforts to clear the field of rivals have not been very successful, and that there are now several companies anxious to do business in competition with it, especially the Bankers and Merchants', whose signs have of late become conspicuously frequent along the city streets. The public will, however, as heretofore, be suspicious and skeptical, and should any news appear respecting amalgamation or consolidation or "boa-constriction," will only say it was just what might have been expected. Meanwhile there is no great popular interest shown in government telegraph schemes now committed to Congress.

## THE MORSE TABLETS.

A gossipy man-about-town, writing in a Sunday paper, complained that the intention of the persons who put up the memorial tablet in front of the old Morse house in Twenty-second street, in this city, is far better than their work. He asserted that in the inscription, "In this house S. F. B. Morse lived for many years and died," the initials were an afterthought, and were carelessly and clumsily crowded into a small space.

It was hardly to be expected that this would pass without challenge. Mr. A. C. Clark, as the one person responsible for the tablet, says that the initials were not an afterthought, but were made smaller because they were considered to be hardly necessary. Mr. Clark adds: "Died standing alone conveys the most interesting association (or what seemed such to those who in advance discussed the matter) connected with the house. If there be faults in the phraseology any amendment will be accepted with thanks."

The difficulty of pleasing everybody is proverbial, but it is not a little singular that the form or the manner of tablets to the memory of the Father of the Telegraph has been the cause of comment and criticism more than once. It was mentioned in *The Operator* last May that the family of the late Professor Morse, at Poughkeepsie, regretted that on the tablet put up in Rome there was no mention of his fame and merits as an artist. "He was the inventor of the electric telegraph" would be recommendation enough for most of us to the favor of posterity, but it was felt that in Rome, the art centre of the Old World, further recognition might have been given on the tablet to the great inventor, as one who was also among the chief of the American artists of his day, and who did much to foster a love of art in this country.

## A GOOD OPENING FOR BUSINESS.

According to a dispatch from Troy, N. Y., the village gas works at Malone, Franklin county, exploded on the 19th inst. The buildings at the works and adjacent structures were demolished, and the village will now be without gas until warm weather.

It seems to us that this occurrence affords a good opening for business to the electric light companies. If the people of Malone are wise they will probably not care to use gas again, and may be persuaded of the superiority of the electric light over gas, oil, wax or tallow. The occasional deaths from blowing out gas or accidentally inhaling it do not impress the public when mentioned singly, but when the grim statistics are brought together the showing is not very agreeable to persons of weak nerves. The casualties and deaths attributable to the use of the electric light in any form have, on the other hand, been found, on the most searching investigation, to be few; and the destruction of property by it has been trivial. We therefore call the attention of the electric light companies to this explosion, with the hope that they will point the moral and improve the occasion. It should not be their fault if the good folks of Malone, instead of enjoying the insistent brightness of the arc light for their streets and stores, and the mellow glow of the incandescent lamp in their homes, sit in the dismal twilight and bad smell of old-fashioned illuminants until "warm weather" comes.

## TELEPHONIC PROGRESS IN THE WEST.

It would be difficult to name a single occupied section of this country in which the use of the telephone is now unknown. Some of the newest parts, where civilization is still in its shirt sleeves, have been as enthusiastic in its adoption as old, long-settled regions. Out West, for instance, the number of instruments is already very large, and the service is increasing at a rate that puts the slowness of some Eastern States to shame. We have before us now the very handsome directory issued by the Nebraska Telephone Co., Omaha. It is beautifully printed, and its wide circulation evidently makes it a good advertising medium. But the chief feature of interest to us in it is the list it gives of no fewer than sixty-four towns and cities that are connected together so that any subscriber in one place can be switched into direct and private communication with any other subscriber in any of the other places. The list includes places in the two States of Nebraska and Iowa, among them being Omaha, Lincoln, Seward, and Elkhorn City, in Nebraska, and Council Bluffs, Red Oak, Tabor, Malvern and York, in Iowa. The system centres at Omaha, which serves as a ganglion, if we may use that term) and is pushing outward beyond its present limits in a manner that shows the management of the company to be very energetic. One might expect to find a complete organization of this kind in the East, where the population is dense and the towns are only a few miles from each other; and some instances are already known to our readers. But there will be many persons surprised to see these signs of Western telephonic growth and activity. It was only a few weeks ago that we gave an account of the extension at Grand Rapids, Mich., where work is being similarly pushed, and where already connection has been established between some fifty cities and hamlets.

TELEGRAPH poles have been put to a new purpose. It appears that three hippopotami came down as far as the second cataract in the high Nile of 1882, which is an unusual thing, and one of the three has remained there ever since. He feeds himself at the expense of the bean-fields of the inhabitants, who, in spite of their indignation, have not yet contrived to put him out of the way, and rubs himself regularly in the evening against the telegraph posts which skirt the river at that point. He has now attracted the attention of a European sportsman, and the days of the versatile creature are probably numbered.

### New York Telephone Companies Consolidating.

The telephone system of this city is now virtually under one management by the consolidation of the Law Company with the Metropolitan Telephone Company. The first in the field was the Law Company, which started in 1875 with dial telegraphic apparatus, with which the leading law firms were supplied. When the telephone became available in 1878 they applied it to their system, and secured about 600 subscribers, obtaining their instruments from the Bell Telephone Company, of New York. They charged $17.50 a month at first, but when the Metropolitan Telephone Company began to compete they charged new subscribers $15. The Law charge has, however, always been willingly paid, as the service given by the company is confessedly of a first-class character, and highly satisfactory to the subscribers.

The Metropolitan Company have about 3,500 subscribers. Their charge is $12.50 a month. They use the Bell telephone, too. It is understood that the Metropolitan Company purchased the Law Company, and pay $150,000 on account, the remainder of the purchase money to be determined by arbitration under the original contracts, which expired on Jan. 1st. The two companies employ about 350 persons. The general superintendent of the Metropolitan Company is William H. Eckert.

Practically, there will be no interruption at all to the Law service, as the system will be continued under the new conditions, and Mr. William A. Childs is already appointed the general manager. The service will, without doubt, find a great many patrons, as heretofore. The offices are continued at 140 Fulton street, where, as usual, the specialties of the Law Telegraph Company will be obtainable.

### Telephone Litigation.

A motion for a preliminary injunction brought by the American Bell Telephone Company against the Overland Telephone Company came up for argument before the United States Circuit Court at Philadelphia on the 21st inst. It was argued on the part of the Bell Telephone Company by G. N. Dickerson of New York and J. J. Storrow of Boston, and for the Overland Telephone Company by Henry Baldwin of Philadelphia and A. J. Keasby, United States District Attorney of New Jersey. The Overland Company asserts priority of invention of the telephone over Bell by Philip Reis of Germany and by J. W. McDonough of Chicago, and also presents a part of the proof taken in another case to substantiate the claims of Daniel Drawbaugh of Pennsylvania. The argument was closed on Thursday evening, and no decision is expected for some little time. The papers are very voluminous. We understand that the Overland Company's service in Philadelphia will be ready for work in a few days, and will then begin operations.

### The Edison Lamp in Germany.

A cablegram is said to have been received on the 24th by T. A. Edison, from Berlin, stating that "in the suit between Edison and Swan, on Edison's principal patent, Edison is victorious. Swan has to pay costs of suit. The value of our patent has increased highly by the victory."

Mr. Edison said to a *New York Times* reporter: "This is a litigation that has been for some time pending in the German courts between Mr. J. W. Swan, the English electrician, and myself, involving the question of right to discovery and application of the fundamental principle of incandescent lighting—the carbon filament lamp. The German laws concerning patents are much more rigid than those of any other country, requiring the most thorough demonstration of priority of invention, and then, if a patent is granted under them, the right in it that they affirm is most inflexibly maintained. So far is this the case that I have known where out of fifty patent principles or inventions granted in this country, only six could obtain the German patent. Swan's defense in this action was an attempt to show the invalidity of my patent by proving that somebody or anybody before me had used the carbon filament for incandescent lighting. It was not necessary that he should show that he had done so himself. To show that anybody had done it would have been sufficient to establish the invalidity of my claim. In that he has signally failed. The effect of the decision is in the highest degree important, not only there, but here and in every other country, for it practically affirms that every other incandescent lamp is an infringement upon the Edison patent."

### Electric Lamps and Regulators.*

On thinking over the announced subject of this lecture as a text, it seems to me that a better title would be "The Evolution of the Arc Lamp," as that is more nearly explanatory of the course in which I shall pursue the subject this evening.

It is well in all human affairs to take occasionally a retrospect, for in that way we, in our progressive course, find threads of thought and experience which we may have neglected to our disadvantage. If we then communicate the facts so brought again to light, to other enquirers, we benefit them as well as ourselves.

With this in view, I have prepared a number of diagrams to illustrate the growth of the art of electric lighting, and which I have divested of all complication as far as possible, intending them simply as graphic illustrations of principles involved, instead of mechanisms.

No art in existence, no matter how far advanced, is a better illustration of evolution of art, than that of electric lighting, imperfect as it is acknowledged to be. And none has been so dependent upon the advancement of all the collateral sciences involved.

The voltaic pile, the first source of dynamic electricity, found the world at the beginning of the present century

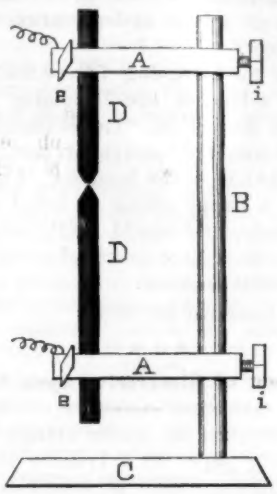



FIG. 1.

with no knowledge of light by electricity; and its first startling brilliancy was an accidental discovery by that great experimenter, Sir Humphrey Davy, who with an immense scientific toy, a voltaic pile of several thousand plates or couples, produced an arc between two charcoal terminals of the battery. This arc, produced by first joining the pieces of charcoal, and then slowly moving them apart, is said to have been made nine or ten inches in length.

This is the longest arc of which we have any record, until after the advent of dynamos of high electromotive force, such as are used in series lighting. A forty-light Brush dynamo is said to be able to sustain an arc of two or more feet in length.

But this experiment of Davy's was far from being of any practical utility, owing to the expense of establishing a voltaic pile, and the short time for which it would give a current of electricity. So the whole matter rested as a mere laboratory experiment, without a hint as to its practical value as we see it to-day, for many years, until after the production of the galvanic batteries of Grove, Daniell, Bunsen and others, about the year 1840.

These experimenters took up the almost forgotten charcoal sticks, and the electric light again flashed forth with increased brilliancy and endurance, so far as the source of electricity was concerned. But charcoal was too fragile, burned out too quickly, and had no practical value. Singularly enough at about this time lighting by incandescence seemed to attract the most attention, and the light produced by Starr in Cincinnati, in 1842, attracted

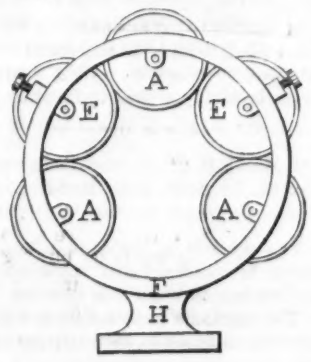



FIG. 2.

much notice. Starr took his then wonderful apparatus to London to show to Faraday. But to this I will refer later on.

In 1844, Foucault, of Paris, sawed square sticks of carbon from retort or gas-carbon, and put them in an apparatus like that shown in Fig. 1, which we now call a hand lamp. Upon the base *C* a glass standard *B* carries the metal arms *A A*, which are movable vertically on *B*, and are kept in desired position by the thumb-screws *i i*. The carbon sticks *D D* are clamped in the arms by the thumb-screws *e e*. The current of electricity passed in and out by the spiral wires shown at the ends of the arms. The movement of separation of the carbons was made by hand, as was the movement necessary to keep the points at as nearly uniform distance apart as possible.

In 1845, Wright, of England, patented the apparatus shown by Fig. 2. On the stand *H* is a ring *F* of insulating material, carrying upon axes the five carbon discs *A A A* and *E E*. The discs *E E* are mounted so as to be moved into, or out of, contact with the other discs by means of the thumb-screws shown. Four sources of electricity were used, connected as follows: One positive wire to the lower left-hand disc *A*; one positive wire to the lower right-hand disc *A*; and two positive wires to the top disc *A*. Two negative wires were led to each of the two discs *E E*. When the screws were applied to *E E* to move them outwards, four arcs were formed, one at each of the spaces between the several discs. It was proposed to rotate the carbons to present new points for combustion to compensate for the gradual burning away. This is the first mechanical arc lamp, and its principle always has a fascination for the beginner in the art. It presents the quality of possessing a large quantity of material for combustion.

[TO BE CONTINUED.]

* Lecture delivered by Dr. N. S. Keith, before the New York Electrical Society, Jan. 16, 1884.

### Not an Unmitigated Blessing.

To most people in Boston the recent interruption of the telephone service by fire was a terrible mishap, and was correspondingly deplored. A few of the subscribers gave it as their opinion, however, that the telephone is not an unmitigated blessing, but might be regarded as a necessary nuisance. One man instanced the following experience:

About once in two or three rings I get something like this:

"Hello, George, dear!"

"Well, hello!"

"Baby just said 'goo, goo!' four times, and I know he wants you to come home to supper."

"Baby! Who in thunder do you think I am?"

"Aren't you No. 11,701?"

"Certainly not! Good day!"

Now, you see that is an interruption to business.

### The Gold & Stock Life Insurance Association.

The annual meeting of the Gold & Stock Life Insurance Association was held in Room 48 Western Union Building, at 5:30 P. M., Jan. 14, 1884.

The meeting was called to order by Vice-President J. E. Hamilton in a few remarks, and the Treasurer and Secretary presented their reports, showing a very satisfactory condition of the affairs of the Association. The following important amendments to the Constitution and By-Laws were moved and adopted:

To make the regular monthly dues 50 cents, and to exempt all new members from assessment for deaths occurring previous to their initiation.

The meeting then proceeded to the election of the following officers for 1884:

President, Daniel E. Pike; Vice-President, J. E. Hamilton; Treasurer, Carl Winkel; Secretary, Edwd. T. Fisher.

Additional members of Executive Committee were elected as follows: Waldo H. Collins, Michael Breslin, A. G. Waring, C. G. Howard.

### Telegraphic Signals on the Erie.

In speaking of the early history of the Erie road, a recent writer in one of the daily papers says that the year 1850 marked an era in railroad management, not only in this country, but in the world, for in that year it was successfully demonstrated that trains need not be run blindly from station to station, but that the telegraph could be made the means of directing them on their way. Up to that time it was the rule of trains going west on the Erie to run to regular stopping-places, where they took the switch until the train running "against them" from the west should pass, and *vice versa*, as locality made necessary. The train in the switch could not go on until the opposite train passed, and consequently delays of hours' duration were common. One day in 1850, when Charles Minot was Superintendent of the road, a passenger train from New York reached Turner's Station, where it was to wait for an east-bound train to pass. It did not arrive on its time. Superintendent Minot was on the train. He telegraphed to Port Jervis and learned that the train had not reached that place yet. Then the idea struck him that he could run both of the trains by the telegraph, and save hours of delay to the west-bound train. He telegraphed to the agent at Port Jervis to hold the east-bound train when it arrived there until he heard from the Superintendent. The latter then told the engineer of his train to go ahead; that they would run on telegraph signals. The engineer refused to take the risk. Superintendent Minot ordered the engineer off the engine and grasped the lever himself. He ran the train, telegraphing orders ahead at each station. The east-bound train reached Port Jervis, and was run to Otisville, 12 miles eastward, while the west-bound train was making its way westward at the same time on telegraphic signals. At Otisville the east-bound train took the switch and the other train passed it, reaching Port Jervis on time. This was the end of the old system of running trains, and was the origin of telegraph signals in running railroad trains.

HOLDING THE FORT IN MAINE.—All of the offices of the Eastern and the Mutual Union Telegraph Companies in Maine were closed "for good," last month, with the exception of Portland and Bangor. These, it is said, will be kept open for business, the reason alleged being that the Postal Company is expected to appear on the scene in the spring.

## A Government Telegraph.

*To the Editor of The Electrical World :*

SIR: Perhaps the number of American telegraphers in favor of the establishment of a government telegraph might be counted in less time than I have occupied writing this sentence. That it should be so small may appear to many to conclusively prove the fallacy of advocating the system, but I hold that the subject has not been placed before us in a proper light. Besides, we have very few—if any—in our ranks who have either worked on government lines or entertained the question sufficiently to be able to logically explain why they should not be encouraged. Having served for many years on one of the tabooed lines in a foreign clime, and having given considerable attention to the subject in its bearings in this country, I take the liberty of endeavoring to point out some features in the service which the casual observer can scarcely have noted, and which will, I hope, place the much decried system in a new light before my fellow telegraphers.

Generally speaking, a government telegraph is viewed as a probable source of power to be abused by the "INS" to the great detriment of the "OUTS" and all opponents of the dominant political party. This opinion is common, and may be the majority of telegraph employés would advance it as an unanswerable argument against governmental telegraphy. I have entertained it myself, but upon reflection, study and experience of such a service, I feel that the position has been sustained by ignorance of its real strength only. During my service on a government line, the administration of the country was really centred in the chief of the State. Not one of his ministers could do an act of any kind whatever in connection with his secretaryship without consulting the chief. The latter's power was absolute in every particular. Notwithstanding this autocratic power not a single case of the abuse of power feared by the OUTS, is on record or can be pointed at in connection with the telegraphic service. If, therefore, in a country such as I have indicated, the privacy of the telegraph can be respected, is it unreasonable to attribute to our own people the possibility of an equal veneration for the rights of their fellow citizens? I think we are apt to judge our rulers at Washington without studying their position, but merely upon the popularity of the ruling cry against them. We do not put our precious selves in their places. If we did, we might realize a conviction that if we were in power the wires would be sacred to the use of the public, that nothing of a purely political nature would permit us to employ its services against an opponent; but on the contrary we would invite the scrutiny of our political enemies in the administration of the telegraph.

Where I see the government telegraph likely to benefit telegraphers is in the feasibility of making it accomplish all and more than originated the recent strike. I would make the service as much a part of the government as the army and navy are. Employés should enter for a fixed term of service, or for life, those accepting the latter condition to be pensioned after a certain period of service and advanced age, in the spirit of the practice in, say the diplomatic and consular services of England, which seems to offer the most beneficent results to the citizen devoting his life to the public service. Their becoming a part of the government in this manner would forever set at rest the vital question to operators of the hours of service, and the equally important one of the possibilities in the line of promotion, for the department would necessarily require these points very distinctly defined, the same as is provided in the army and navy. All jealousies and heart-burnings respecting desired advancements and questions of favoritism would almost cease, as each one would have his *rights* established by law, and could easily defend them against would-be usurpers. On entering the service each aspirant to telegraphic honors would know precisely to what position therein he might reach, without fear of obstacles in his path beyond those his own conduct may create. I would allow the employés in admitted unhealthy States or districts to count five years towards term of service to warrant a pension for every three completed therein. This is the practice in the diplomatic, etc., service already alluded to.

It will be observed that I make our entry into the service of the Government entirely free of political patronage by assimilating it to that of the Army and Navy, and as a consequence our political opinions would never have to do with our stay in office. I think it is quite natural to suppose that we would, if not at once, at least eventually, become part of the Post-Office Department proper; and why would it be strange that we should absorb that department? I mean, might we not by our intelligence and aptitudes make it clear to the Government and country that we are the best fitted to work successfully that department of the public service? And now for our particular advantage: Would it not be something to look forward to the possibility of our making our "line of promotion" lead to the occupancy of desirable postmasterships?

Beside these advantageous vistas for the profession, I would call the attention of patriotic men and women in our ranks who bewail the lack of earnestness in the question of civil reform to the possibilities in that much desired boon which our falling into the Government control might develop. Imagine the post-office and telegraph united and under the *régime* I have indicated and you will see a present source of corruption abolished! With the telegraph and post office united in the way I would do it, one extensive branch of official patronage would be done away with, and a very great stride toward "civil service reform" be made in a quiet way. I think that in the event of my views receiving the approbation of the fraternity it would be in their own interest to advocate them freely, so that their views may reach our Representatives and Senators, and that the latter may take up the question again with the conviction that we are with them and will aid them all in our power to establish the telegraph as a national institution. Heretofore we have thought that national telegraphs were a delusion, and our remarks thereupon have been all pointed at deprecating even the discussion of the subject.

Since writing the foregoing I have read Mr. Hubbard's comprehensive article in the December number of the *North American Review* on "Government Control of the Telegraph," and would recommend its perusal most strongly to all my companions in the business. I imagine that Mr. Hubbard is in a happy frame of mind to ventilate the subject very freely, and would gladly second any endeavors of ours to arrive at a practical solution of the question of our material progress.

SA.

NEW YORK, December 30, 1883.

## The Effect of Electricity upon Watches.

"Decidedly watches are queer things," said the editor of a jewelry-trade paper to a *Tribune* reporter. "They possess some unaccountable peculiarities. For instance, some time about the beginning of last summer, when there had been a succession of fine displays of the aurora borealis, it was estimated that in a single night in the city of New York the main-springs of not less than 3000 watches broke. This estimate is based on actual inquiries. Fine sensitive watches are particularly liable to be affected by electrical atmospheric disturbances. During the months of June, July and August, when these phenomena are most frequent, there are more mainsprings broken than during all the remaining months of the year. They break in a variety of ways, sometimes snapping into as many as twenty-seven pieces.

"There are occasions when it is a very serious matter to have your watch magnetized. The most striking instance in point is one which lately came under my notice. Captain W. R. Smith commands the steamer Delaware, which plies between New York and New London. Before putting to sea on a recent voyage he was invited to inspect an electric light dynamo machine, and examined its parts closely. Soon after getting on board the steamer he observed that the compass became strangely affected when he approached it. Whether he stood on the right or the left, or immediately in front of the compass, the needle would invariably point to him. The compass was worse than useless when he came near it. It was dangerous and might wreck the ship. You can imagine that this phenomena alarmed and puzzled Captain Smith not a little. At length he recalled his visit to the dynamo machine, and the true solution to the eccentric behavior of the needle flashed upon him. His watch had become magnetized. When he removed it the needle resumed its constancy to the polar star. On his return to the city he took the watch to a certain firm here, who demagnetized it for him. This firm have invented some machine, the mechanism of which is a secret, by which they demagnetize a magnetized watch speedily and effectually. They have watches sent them from all parts of the world to be thus treated."

THE address of Mr. D. H. Bates, now President of the B. & O. Tel. Co., is Room 13, 7th floor, Mills Building, Broad St., this city.

UNDER THE THAMES.—It is stated that a company has been formed in London to construct and work an electric railway under the River Thames, through iron caissons. The engine is to be stationary. The carriages impelled by it will run separately and occupy about 3½ minutes on each trip across.

EMBEZZLEMENT OF WESTERN UNION MONEYS.—On Dec. 27 it was reported from Atlanta, Ga., that the night clerk of the W. U. Co. there had absconded with $276 belonging to the Co. Last week a young man employed in the office of the cashier of the Company in this city was arrested under a charge of larceny. About a year ago he began to pilfer, it is said, and the sum misappropriated reaches about $1000.

T. M. B. A. ASSESSMENT.—Under date of the 1st inst. assessment No. 171 has been made by the T. M. B. A. It will meet the payment on account of W. K. Applebaugh, and is for one dollar from each member up to No. 4,640. The death claim of Hugh Nelson is mentioned on the notice, but will be satisfied from the surplus. The number of members in good standing in the Association, first division, is 2,597; in the second, 227.

PLASTIC CARBONS.—To make plastic carbons for batteries the following receipt is recommended by M. Max Nitsche Niesky: Good coke is ground and mixed with coal tar to a stiff dough and pressed into moulds made of iron and brass. After drying for a few days in a closed place it is heated in a furnace, where it is protected from the direct flames and burned feebly at first, then strongly, the fire being gradually raised to a white heat, which is maintained for six or eight hours. The fire is then permitted to slowly go down, and when perfectly cold the carbon is taken out of the furnace.

## THE TELEGRAPH.

ASKING TO BE LISTED.—The New York Mutual Telegraph Co. has applied to the Stock Exchange to list its capital stock of $2,500,000.

BRITISH TELEGRAPH REVENUE.—During the past year there was an increase of £60,000 in the revenues of the British telegraph service.

JOINING MR. BATES.—Supt. Zeublin, of Philadelphia, and Supt. Roche, of Boston, have resigned their positions with the Western Union Co. and gone over to the B. & O. Co. to join Mr. Bates.

SEVERING CONNECTION WITH THEM.—Mr. George B. Pennock announces that he has withdrawn from the Goebel Underground Company and has sold out his interest in the Eastern Union Cable and Telegraph Company.

PERSONAL.—Mr. Partrick, of the firm of Partrick & Carter, the well-known manufacturers of telegraph instruments and supplies, of Philadelphia, has sailed for a three months' voyage to the West Indies, in the schooner "Lizzie H. Partrick," of which he is the principal owner.

WESTERN UNION EARNINGS.—Officers of the Western Union Telegraph Company estimate that the earnings for the current fiscal year will exceed $19,000,000. It is stated that transfers of stock in small lots on the company's books have been at the rate of from 1,000 to 2,000 shares a day for some weeks.

ORGANIZING THE NATIONAL TELEGRAPH CO.—The National Telegraph Co. was organized on the 21st, and elected George T. Williams General Manager. This gentleman was for many years District Superintendent of the Western Union Co. at Cincinnati, O. The lines of this new company extend from New York to Chicago along the West Shore and Nickel Plate tracks.

ORGANIZING A LAW DEPARTMENT.—The Bankers and Merchants' system of telegraph companies has engaged Mr. R. S. Guernsey in its Law Department, which has been lately organized. It will be remembered that Mr. Guernsey held for some years a responsible position in the law department of the Western Union, and after that time was in the law department of the M. U. Tel. Co.

A SPLENDID MEERSCHAUM PIPE.—We learn from London-England, that on Christmas Eve the staff there of the Western Union Telegraph Co. presented Mr. H. S. Robson, manager, with a splendid meerschaum pipe as a mark of their esteem and regard. It will be remembered that Mr. Robson was manager of the French Cable Co.'s office at 135 Broadway, before he left to fill his present position.

ANOTHER CONSOLIDATION.—The Bankers and Merchants' Telegraph Company has during the past week obtained control of the Commercial Telegram Company. The directors of the Bankers and Merchants' were elected as directors of the Commercial Telegram Company and A. W. Dimock, President; G. S. Mott, Vice-President; and J. G. Case, Secretary of the former company, were chosen by the directors to fill the same positions in the latter.

THE MEXICAN TELEGRAPH CO.'S PROGRESS.—The Mexican Telegraph, which declared a 4 per cent. dividend on the 20th, makes the following exhibit:

| | 1883. | 1882. | Inc. or Dec. |
|---|---|---|---|
| Gross earnings..... | $233,040 | $153,086 | $79,974 |
| Expenses..... | 58,059 | 62,391 | 5,232 |
| Net earnings..... | 174,945 | 89,675 | 85,270 |

The line consists of a cable from Galveston to Vera Cruz, and is the main artery through which pass all the messages between the United States and Central and South America.

NEW DISTRICT COMPANIES IN NEW ENGLAND.—Certificates of incorporation of the Manchester, Lowell and Lawrence District Telegraph Companies were filed in the County Clerk's office last week. The lines of the companies are to run from this city through Connecticut and Massachusetts to Lawrence and Lowell in the latter State, and to Manchester, N. H., respectively. Each company has a capital stock of $60,000, divided into 6,000 shares of $10 each. All the shares of the three companies are held in equal proportions by C. D. Haines, E. T. Haines and S. H. Sterns.

THE DISPOSAL OF OLD TELEGRAPH SUBSIDIES.—The Secretary of the interior sent a communication to the House of Representatives last week in reply to a resolution asking information with regard to telegraph companies which have received subsidies in bonds or lands and have transferred their rights to other companies. The Secretary says that neither the Commissioner of the General Land Office nor the Commissioner of Railroads has in the files of his office evidence of any such transfer or attempted transfer. He has instructed the Railroad Commissioner, however, to call on subsidized railroad companies for the desired information, and in case any such transfer has been made to furnish him with its terms.

GOVERNMENT TELEGRAPHS.—Senator Edmunds was present at the meeting of the Senate committee on post-offices and post roads, Washington, on the 17th, and in a conversational way gave his views upon several points involved in the consideration of the postal telegraph bill. He entertained no doubt in regard to the constitutional right of the government to build telegraph lines. He was strongly opposed to the purchase of existing lines. His views on the remaining features of the subject were substantially those embodied in his bill. The committee has authorized its chairman to fix an early day, when persons representing the telegraph interest and others desiring to be heard may be admitted, for the presentation of oral arguments. Briefs may be submitted if desired.

THE ATTITUDE OF CHICAGO MERCHANTS.—Speaking of the attitude and sentiments of Chicago merchants toward the Western Union Co., Chicago *Sparks* says: "The Western Union Telegraph Company have three large offices on 'Change, and they also maintain two Mutual Union (?) offices, to hold the space they occupy from being taken by opposition telegraph companies. Tariffs are reduced to special points, not from any good will toward members, or equalization of rates, but to injure other companies. The first opportunity the rates are advanced. This game has been played so often, it has incensed the members

to such an extent that they have for some time past owned and operated their own lines to Milwaukee and St. Louis. The day is not far distant when the merchants will own lines radiating from Chicago to all the principal exchanges."

WIRE FENCE TELEGRAPHY IMPRACTICABLE.—The idea has long been prevalent that wire fences on farms and pastures out West could be utilized for telegraphic purposes. Experiments to determine this have been conducted on the Milwaukee & St. Paul R. R. branch and the Brandon branch, over a stretch of 30 miles of barbed wire, which was properly fixed and run under ground at road crossings. Mr. Simpson, superintendent of telegraph, decides that the plan would not answer. The work might be satisfactorily done in summer, but during the winter the line, hidden under huge snow-drifts, would be useless; and the same objection would apply to most of the thousands of miles of wire fencing in the West. Down South the fences are still largely of the wooden zigzag type, and therefore unavailable.

ARRESTED FOR DAMAGING POLES.—Several years ago, says a dispatch of the 21st from Reading, Pa., the Western Union Telegraph Company in straightening their wires along the Lebanon and Dauphin turnpike found it convenient to place their poles in one of the fields belonging to A. M. Potteger, in Stroudsburg, instead of putting them on the highway adjoining. The owner several times notified the Western Union agent to remove the poles from his land, but without avail. One morning it was found that the bottoms of these poles running through Potteger's land were perforated with auger holes, so that the least wind would have blown them down. This occurred two years ago, and as no evidence could be found against the pepetrators, who were believed to be the Pottegers themselves, the matter was dropped. Last week, at the instigation of parties unfriendly to Mr. Potteger, the Reading police visited Stroudsburg and arrested W. S. Potteger on the charge of damaging the poles.

ABROGATING A LEASE OF SPECIAL WIRES.—A Washington special of Jan. 16 to the N. Y. *Graphic* says: A rumor prevailed this morning of a rupture between the Chicago *Inter Ocean* and the Western Union Telegraph Company, caused, it is said, by the publication in full yesterday of Senator Hill's speech on the special telegraph bill. The local manager of the Western Union yesterday afternoon peremptorily abrogated the paper's leases of special wires. It had the longest line of wires in the country, extending to New York, Washington, Chicago and St. Paul. The lines were manned by its own operators. It appears that the only thing known about it is that the Washington corrrespondent of the *Inter-Ocean* received a dispatch last night from the business manager of the paper saying that the lease had expired. This is generally considered as rather thin. Leases that involve so much do not expire so suddenly. The correspondent of the *Inter-Ocean* admitted that he had not been directed to discharge the operator, and had not done so and was waiting instructions.

AN IMPORTANT DECISION.—In the Montreal Court of Review, judgment has been rendered in the case of the St. Lawrence Steamboat Company *vs.* the Great Northwestern Telegraph Company, in which the plaintiff claimed damages for the non-delivery of a telegraph message. The dispatch was sent to the captain of the "Prince Arthur," one of the plaintiff's steamers, instructing him to go to Coteau, meet another steamer, the "Maxwell," take her passengers and return with them to Montreal. The telegram did not reach the "Prince Arthur," and consequently she missed the "Maxwell" and went on to Montreal, thus causing expense to the plaintiff which would have been avoided had the instructions been carried out. The Superior Court gave judgment for the plaintiff for $50 and costs. The Court of Review, however, was of opinion that the defendant could not be held responsible. It was not the delay in sending the telegram which really detained the boat. The steamboat, it was proved, had caused an accident to the canal, for which she was detained by the inspector until security had been given for the damage, and this detention was the cause of the captain not carrying out his orders. The company could not, therefore, be blamed.

COPPER AND OTHER WIRES.—Mr. W. H. Preece recently gave at the Institution of Civil Engineers, some interesting information on the subject of wire conductors for electrical purposes. Copper is, he said, almost universally used for insulated conductors, and the manufacture has been so much improved that it is now twice as good it was in 1856. Copper wire has a breaking strain of 28 tons per square inch, while iron wire breaks with 22 tons. The best copper comes from Japan, Chili, Australia and Lake Superior, but a great deal of pure copper is obtainable by electro deposition. The ordinary best puddled iron is at present used only for fencing purposes, but a mild English Bessemer steel is largely used for railway telegraphs and for stays, although the resistance is very high, owing to the presence of manganese. The wire used by the post office is made from Swedish charcoal-iron. Swedish Bessemer, or a specially-prepared low carbon English Bessemer, is adopted by the Indian Government. Cast-steel wire, with a breaking weight of about 80 tons to the square inch, has been adopted on the Continent for telephone currents; while in England, where speed of working is the prime consideration, electricians are satisfied with a breaking strain of 22 tons on the square inch. In the colonies, where long spans are essential and speed of working is not so important, the specification is 30 tons on the square inch.

## THE TELEPHONE.

THE SOUTHERN NEW ENGLAND CO.—A quarterly dividend of 2½ per cent. has been declared by this company.

THE EQUITABLE TELEPHONE CO.—"A Subscriber," New York, writes: "The Equitable Telephone Co. was incorporated on the 16th, with a capital of $3,000,000. I see no notice in any paper." Nor do we.

THE ERIE CO.'S GROWTH.—The months of October, November and December saw 900 subscribers added to the list of subscribers of the Erie Co., making a total number of 8,300 now connected with it.

A NEW COMPANY IN ILLINOIS.—The following company filed articles of incorporation at the office of the Secretary of State on the 14th inst.: The Locomotive, Telephone & Electric Railway Signal Company, at Chicago, capital $2,000,000; incorporators, Gustav A. Wooley, Thomas A. Woodason, and Fred. H. Binder.

THE BELL CO.'S CLAIM ON THE GOVERNMENT.—The claim of the American Bell Telephone Company against the Government for payment of a royalty on all telephones manufactured by the United States Signal Service in use by the Government as infringements on the Bell patents was settled on the 25th by a contract whereby the Government pays the Bell Company the royalties claimed.

IMPROVEMENTS AT FARGO, DAK.—The telephone office, Fargo, Dak., has been removed from its old location to the third floor of the Hagaman block. One hundred and eighty-eight instruments are now in use and the tables have a capacity for 300. There are 75 miles of wire connecting with the exchange. On all the principal streets new poles have been set. The improvements have cost about $2,000. Mr. H. D. Smith is the Superintendent.

ROCKY MOUNTAIN BELL TELEPHONE COMPANY.—In a meeting of the board of directors of the Rocky Mountain Bell Telephone Company, held at Salt Lake City, Jan. 10, the following changes of officers took place: A. J. Pattison sent in his resignation as vice-president and treasurer, and it being accepted, the General Manager, C. F. Annett, was elected vice-president (Mr. J. J. Dickey still to remain president), Geo. Y. Wallace, treasurer, L. B. Moore, secretary.

HOW THE "SOUTHERN YANKEES" LIKE IT.—The last list of subscribers issued by Mr. H. H. Jackson, manager of the Atlanta, Ga., Telephone Exchange, contains about 350 names, a very good showing for the busy Georgia city. There is a Decatur toll line worked in connection with the exchange, and the charge for the use of it is 15 cents for each five minutes or fraction thereof. Telegrams can be sent to or received from the Western Union office by the telephone without expense to the subscriber interested.

NOT COVERED BY THE BELL PATENTS.—Three Western country people, an old man and two daughters, happening to be in the neighboring city, entered a store in idle curiosity. The first object to attract their attention was the elevator silently moving up and down with its cargoes of passengers. "What's that, pau?—that thing going up and down with sofys in it?" asked one of the daughters. The old man gave the elevator a long, calm, and deliberate stare and exclaimed, with awe-struck voice, "It's a telephone; the first I ever see!"

IN PHILADELPHIA.—At the meeting of the Philadelphia Councils' committee on the police and fire alarm telegraph on the 3d, an ordinance was introduced to authorize the Clay Commercial Telephone Company to place its wires upon poles belonging to the city. A representative of the company stated that it was composed of active business men, who had gone into the enterprise for the purpose of competition. The ordinance was referred to a sub-committee. The telephones in the various city departments were reported as being in an unsatisfactory condition, and the Superintendent was directed to notify the companies that unless they were placed in order their privileges would be recalled.

ONE OF THE TELEPHONE MAGNATES.—Some gossip has lately floated around in the papers with regard to the habits of Mr Blake, whose transmitter is used with the Bell Telephone. We have reproduced one item with regard to his enormous lager "schooners" and his odd shoes. Another item says of him: "He lives just out of Boston in the rural town of Weston, where he has a palace and lives like a duke. He bears his great wealth well, and is more of the type of the English country gentleman than is possible for the average new rich man to become. He amuses himself as an amateur blacksmith or machinist, working in metals with his own hands at his forge. He rarely comes to the city, but prefers his quiet life among his tools and his cattle."

THE INTER-CONTINENTAL CO.—Regarding the Inter-Continental Telephone Company, in which Boston capital is largely invested, advices just received per steamer Caracas, from La Guayra, Venezuela, show that the company's business is rapidly increasing. The trunk line between Caracas and La Guayra was completed on the first day of January, as anticipated, and its first day's business was fifty-four telegrams, or rather "telephonagrams." La Guayra being the port of entry to Caracas, the capital of Venezuela, a very large business between the two cities is assured. The system already embraces 190 subscribers at Caracas and sixteen at La Guayra, paying a monthly revenue of $1,030, fifteen more subscribers await connection at La Guayra and thirty-five at Caracas, besides which applications for exchanges at Valencia, Porto Cabello and other points are under consideration. The present revenue of the company is equal to 6 per cent. on the entire capital.

ON THE PACIFIC SLOPE.—The Sunset Telephone Co. is actively pushing operations in its territory in California. It is believed locally to be working in the interests of the Postal Telegraph Co. Recently cables have been laid in the Bay and Carquinez Straits, and wires to Benicia. Another runs down to San José by Menlo Park. A few weeks ago the erection of two wires from Sacramento to Benicia to connect with the lines to that place was commenced. The places to be on the lines and connected with each other are San Francisco, Antioch, Alameda, Berkeley, Brooklyn, Clayton, Concord, Congress Springs, Danville, Davisville, Dixon, Elmira, Haywards, Los Angeles, Martinez, Menlo Park, Mill's Seminary, Mt. Hamilton Observatory, Oakland, East Oakland, West Oakland, Pacheco, Port Costa, Redwood City, Sacramento, San Bruno, San José, San Leandro, San Mateo, San Pablo Suisan, Vallejo, Walnut Creek and Woodland.

A COMPARATIVE STATEMENT.—As a matter of interest to many of our readers, says the Boston *Globe* of the 20th inst., we give herewith a brief comparison of telephone companies in which they are interested, showing the capital, par value, gross and net earnings of each: Tropical American Telephone Company—Capital, $400,000; par value, $10; earnings, $17,000 net past twelve months. Mexican Telephone Company—Capital, $1,250,000; par value, $10; earnings, $12,000 gross or $6,000 net. Mexican Central Telegraph and Telephone Company—Capital, $450,000; par value, $10; earnings, $250 net for November, 1883. Inter-Continental Telephone Company—Capital, $200,000; par value, $10; earnings, $1,030 gross for December, 1883. A careful comparison of the above figures, which are taken from printed statements made by the several companies, in connection with a consideration of the territory controlled by each, the rights and contracts held by each, and the earning capacity of each, will show that the greatest difference exists in the quoted market prices and the real value of the shares of these four companies. Tropical has earned a net 14 per cent. on $350,000, its issued capital, figuring the shares at $3 each. They are quoted at $1.50 to $1.75 bid and $2 asked. Mexican has earned a bare 1 per cent. gross on its issued capital. Its shares are quoted 2⅛ to 2⅝ bid, 2¾ asked. Evidently telephone shares, as well as other shares, are subject to queer preferences.

## THE ELECTRIC LIGHT.

PEKIN, ILL.—The Pekin, Ill., Electric Light Company, capital $10,000, has been incorporated.

IN CHICOPEE FALLS MILLS.—The Chicopee Falls (Mass.) Manufacturing Co. is to introduce the electric light into its mills.

CUMMER ENGINES.—The Cummer Engine Co., of Cleveland, O., has recently received orders for an engine for the Brush Electric Light Co., Detroit, Mich., and another for the Brush Electric Light and Power Co., Toledo, O.

FOR THOSE IN PERIL ON THE SEA.—The French are said to have been among the first to employ the electric light in lighthouses. Since Havre de Grace was thus illuminated the light has been introduced into 43 lighthouses on the French coast.

SHANGHAI DISSATISFIED.—It would appear that the electric light is not yet fully appreciated in Shanghai, China. The city authorities are said to be greatly dissatisfied with it, and to propose adopting measures to cancel the contract with the local company unless the service is improved.

AN ACCOUNTING FOR $100,000 WANTED.—C. W. Bartlett has, on behalf of stockholders living in New Hampshire, filed a bill in equity in the Supreme Judicial Court against the American Illuminating and Electric Company to compel the officers of said company to make an accounting of $100,000 which was sworn to have been paid into the treasury at the time the act of incorporation was granted.—*Boston Transcript.*

A SIX PER CENT. DIVIDEND.—The Allegheny County (Pa.) Light Co. declared a dividend of 6 per cent. on the 2d inst. This company appears to be doing a good business. The prospects of lighting the principal streets of Pittsburgh are very encouraging. Petitions signed by every business man on Fifth avenue and Smithfield street have been presented to the Councils, who will act on the matter during the present month.

THE OLMSTED ELECTRIC LIGHT.—This company now has its general offices at 79 John street, this city. The officers are: Michael Chauncey, President; Aaron Brinkerhoff, Vice-President; A. W. Lewes, Secretary and Treasurer; Joseph Olmsted, Electrician; H. S. Belmont, Assistant Electrician. The factory is at Wythe ave. and Hewes street, Brooklyn. The company will exhibit a six-arc light installation at their offices in a few days, and are now making 6, 10, 16 and 20-light machines. They have also in course of construction a 40-light machine.

A NEW COMPANY FOR PITTSBURGH.—The Finney Electric Light Company, of Pittsburgh, has been chartered with a capital of $25,000. The new corporation is formed for the purpose of taking and holding patents for the manufacture and sale of electric lighting and telegraphic machinery and devices relating thereto, and for telegraphic and other devices. The directors are: Charles C. Fitzhugh, John W. Chalfant, W. A. McIntosh, Allegheny; Albert H. Childs, J. R. Finney, David F. Henry, Pittsburgh; Frank Rahm, Philadelphia.

BURLINGTON, IA.—The dynamo-electric machine to be used by the Burlington, Ia., Electric Light and Power Co., arrived at that place from Chicago on the 14th inst., and operations were at once begun to put it in place at the Murray Iron Works, where the steam power is supplied. The Van Depoele Co. were notified that everything was in readiness for the Superintendent of construction, and it is now thought that the light will be burning by the first of February. The Board of Underwriters have been asked to name the rules for wiring buildings, in order that all requirements may be promptly met. The directorate of the company is an able body of men, and a great success is anticipated.

A VETO AT TRENTON, N. J.—Mayor Vroom, of Trenton, N. J., sent in to the Council on the 15th a veto of the ordinance giving the Trenton Electric Light and Power Company the right to erect wires and poles in the city. The Mayor offers several reasons for his course, one of which is that no provision is made in the ordinance for gaining the consent of the property owners; another is that there is no provision for compensating the city for the privilege granted to the company, and still another the Council's lack of power to bestow the rights in question. There is great interest manifested in the subject by the merchants and real estate owners of the city, and it is said an effort will be made to have the Common Council pass the ordinance over the veto.

THE EXCELSIOR RIGHTS IN CANADA.—The Toronto Electric Light Co., Limited, with an authorized capital of $200,000, have been reorganized with the following officers: E. S. Cox, President; John T. Beckwith, Vice-President; Robert Myles, Secretary and Treasurer; S. Hamburger, Manager; who, together with Dr. S. R. Beckwith, of New York, and T. F. Worts, constitute the Board of Directors. The company control all the Canadian patents of the Excelsior Electric Co., of 66 Duane street, New York, and have the exclusive right to manufacture and sell under these patents in Canada. They have 55 lights going now, and have all the machinery to increase the plant to 105 lights as soon as the weather permits. The City Council has granted the company all the concessions necessary for their present purposes.

THE ARMINGTON & SIMS CO. BUSY.—The Armington & Sims Engine Co. have had three large engines at the Edison central station, 259 Pearl street, this city, working most satisfactorily for the last two years. These engines replaced two others of different make, and now an order has been received for two more to replace another two that have been found wanting. The company

have recently shipped three 50-horse power engines to the Jenney Electric Light & Power Co., Peoria, Ill.; two to the steamer City of Worcester; one to the Electric Light Co. at Fall River; one to N. P. Robinson, Honolulu, S. I.; one to the Brush Electric Light Co., Norfolk, Va.; two large engines to the Edison Illuminating Co., Newburgh, N. Y.; one to the State Capitol Building, Lansing, Mich.; and one to Markle & Hall, Detroit, Mich. The works are driven to their fullest capacity, more machinery has been bought, the force has been increased, and orders are filed that will keep the company busy for the next three months.

THE BRUSH-SWAN CO. IN WASHINGTON.—The Brush-Swan Electric Light Company, of Washington, D. C., organized on the 19th by the election of the following board of directors: A. A. Hayes, Simon Brentano, Charles Payson, Stilson Hutchins, W. H. Slack, W. F. Mattingly and Hallet Kilbourn. Mr. Hayes and Mr. Mattingly were also appointed a committee to draft a set of by-laws, to report to a meeting to be held on the 2d of February, at which time the executive officers will be chosen. It is understood, says the Washington *Post*, that Mr. A. A. Hayes, who has been prominently identified with the New York Brush-Swan Company for a number of years, will be chosen president, and Mr. Payson, late assistant Secretary of State, treasurer. Much more than the amount of stock required has been subscribed, and it was found necessary to reduce the proportion of the larger stockholders so as to accommodate the demand. It is expected that the work will be begun at once, and among the earliest interesting exhibitions will probably be the display of thirty 2,000-candle light lamps from the dome of the Capitol and from the top of the Washington monument.

LIGHT CONVERTED INTO ELECTRICITY.—Herr Sauer has invented a sunlight battery, described in the *Electrotechnische Zeitschrift*. The chemical rays furnish the power, and the battery will only act in sunlight. It is not, therefore, likely to be of much use in such cloudy countries as England, where, during one recent week, not an hour of clear sunshine was recorded. It consists of a glass vessel containing a solution of fifteen parts of table salt and seven parts of sulphate of copper in 106 parts of water. In this is placed a porous cell containing mercury. One electrode is made of platinum and the other of sulphide of silver, and both are connected with a galvanometer. When not in use the whole is inclosed in a box. When in use the platinum electrode is immersed in the mercury, and the other in the salt solution; the battery is placed in the sunlight, and the galvanometer needle is then found to be deflected, the sulphide of silver being the negative pole. If the sun is clouded, or any other change in the intensity of the light occurs, it is indicated by the needle. The exact effect produced by the light rays does not as yet appear very clear; but their presence distinctly produces electrical action, and their absence suspends it.

JEWELRY FOR THE FAIR SEX.—M. Gaston Trouvé, of Paris, has frequently shown himself to be a most ingenious electrician. One of his latest achievements is the designing of electric light jewels, the use of which will, we are certain, electrify an assemblage and increase the magnetism of the fair wearers. The stones are cut and colored to resemble diamonds, rubies, sapphires, and the like. Beneath them is an incandescent lamp of low resistance. This lamp is fed from a small battery, carried on the person. It is composed of three pairs of zinc carbon plates (two carbons to each zinc), or a larger number, according to the current required. These plates dip in a saturated solution of bichromate of potash, contained in an ebonite cell with three compartments, and are fitted into a cover, which is kept securely down on top of the cell by two bands of india rubber passed around the whole. Finally, the battery is incased in two sheets of gutta percha, to prevent any leakage. A miniature switch, carried handily in the pocket or elsewhere, connects with the battery and lamp wires. The pressure of a finger on the arm of this switch makes or breaks communication with the lamp. The battery weighs (with six plates) 300 grammes. It will work about thirty minutes with a lamp of from two to three volts.

## MISCELLANEOUS NOTES.

THE COMMERCIAL CABLE CO.'S PROGRESS.—A dispatch from London of the 25th says: "Mr. Mackay has contracted for the patent duplex for working his two cables."

THE COMMERCIAL CABLE CO.'S INTENTIONS.—A dispatch from London of the 23d inst., says that Mr. Mackay has written a letter to the *Times* on behalf of the Commercial Cable Company, stating that when the company's two cables are completed they have no intention of entering into any agreement or coalition with existing companies.

ELECTRIC BRAKES.—According to the *Journal of Railway Appliances*, the Waldumer electric brake is likely to be introduced at an early day on one of the prominent trunk lines of this country, and is being investigated with favorable intentions by one or more prominent foreign railways. Mr. L. W. Goss, who is prominently connected with the enterprise, is a leading attorney of Cincinnati, and expresses great satisfaction with the mechanical operation of the brake as far as it has been tested.

RAPID TRANSIT SCHEMES IN NEW YORK.—During the session on the 22d of the Rapid Transit Commissioners, the Riley Railway Construction Company submitted plans for a system of elevated railroad which would only have a single row of posts that they claimed could be constructed for $75,000 per mile. The superstructure would be four feet wide over all, and electric motors and compressed air engines could be used. Another scheme, that of a cable railway company, includes a patent securing to the company the right to lay telephone and telegraph wires in the cast-iron tunnel in which the cable runs.

THE "A. B. C." CABLE CO.—The English paper *Money*, of Jan. 9, gives the following clear and explicit information about the American, British and Continental Cable Co.: Since our last notice of this projected scheme negotiations have been pending for the acquisition, in both hemispheres, of extended telegraphic rights, supplementary to those which had been already obtained. These additional concessions put the company into possession of a system unequalled in magnitude and importance in submarine enterprise. Fresh guarantees of powerful financial support are being daily received, and the company will appear before the public with its share list largely underwritten. Within the past week the necessary contracts for the construction and laying of the cables have been entered into.

## STOCK QUOTATIONS.

Telegraph, telephone and electric light stocks were quoted as follows on Wednesday at the Electric Manufacturing and Miscellaneous Stock Exchange, and at the Stock Exchange:

TELEPHONE.—American Bell, b 176, a 178; American Speaking, a 175; Bay State, b 90, a 97; Boston & Northern, b 90, a 100; Central American, b 115; Currier-Bell, b 1; Colombia and Panama, b 19.87, a 20; Continental, b 2, a 15; Dolbear, b 5, a 10; Erie, b 37, a 40; Granite State, a 85; Globe, b 2; Hudson River, b 60, a 85; Mexican, b 2.37; Mexican Central, b 1.60 a 2; Molecular, b 3, a 9; New England, b 47.50; New York and New Jersey, b 75; New York and Pennsylvania, b 75, a 85; National Bell (new), b 65, a 90; Overland, b 5; People's, b 10; Peoples' (N. E.), b 1.50, a 1.55; Shaw, b 10, a 17; Solenoid, a 125; Suburban, b 100, a 110; Southern Bell, b 95, a 125; Southern New England, a 175; Tropical, b 1, a 1.13; West India Telegraph and Telephone, b 1.90, a 1.95.

TELEGRAPH.—Am. T. and Cable, a 60; Am. R. Transit, a 60; Bankers & Merchants', a 121⅝; Commercial Telegram Co., a 80; Mexican, b 240, a 245; Mutual Union, a 16½; Postal (stock), b 4, a 47.5; Postal Bonds with stock, b 53; Postal Bonds ex-stock, b 48, a 51; Postal (new Co.), b 4.95; Western Union, b 72¾, a 72⅞.

ELECTRIC LIGHT.—American, b 4, a 8; Brush, b 50, a 65; Brush Illuminating, b 48, a 65; Daft, a 80; Edison, b 180, a 185; Edison Illuminating, a 65.50; Edison Isolated, b 100, a 130; Edison, European, b 2, a 15; Excelsior, a 35; Fuller Electrical, b 10, a 28; Swan, a 90; United States, b 90, a 95; United States Illuminating Co., a 95.

# OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

**Edited by N. S. KEITH, Electrical Engineer and Expert, 237 Broadway, New York.**

### PATENTS DATED JAN. 8, 1884.

**Conduit for Underground Electric Conductors**; Eli T. Starr, of Philadelphia, Penn., assignor of one-half to William J. Peyton, Washington, D. C.. 291,798

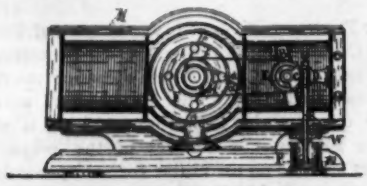
**Current Regulator for Electric Motors**; Charles J. Van Depoele, of Chicago, Ill..... 291,650
The power and speed of the motor are regulated by a centrifugal governor which opens or closes, as needful, a greater or less number of circuits around the cores of the field magnets.

**Cut-Out for Telephones**; Austin Williams and Joseph M. Gannon, of Negaunee, Mich..... 291,825
A lightning arrester for telephone stations.

**Electrical Insulating Material**; John Greives, of Paterson, New Jersey.....291,716, 291,717, 291,718

**Electric Circuit Closer**; Charles J. Van Depoele, of Chicago, Ill..... 291,648
This is a cut-out for an arc lamp, and depends upon either the expansion or fusion of a wire which is brought into circuit by excessive attraction of the shunt-magnet of a differential system.

**Regulator for Dynamo-Electric Machines**; C. J. Van Depoele, of Chicago, Ill..... 291,554
The iron bar *B* is pivoted at *C* and connected by a belt with



the disc *F* which carries the brushes. The movement due to the tendency of *B* to place itself at right angles to the field-magnet coils, and parallel to the core, is communicated to the disc and brushes. The more intense the current flowing in the coils the more *B* is deflected, and the brushes correspondingly moved on the commutator, or collector, to compensate therefor. Weights *W* serve to counter-balance the tendencies for movement; and a dash-pot *P* serves to prevent too sudden motion.

**Electric Railway Signal**; William Vogel, of Chicago, Ill., assignor of one-half to Wm. T. Underwood and Bernhard Schram, of same place..... 291,556

**Electric Motor**; Levi W. Stockwell, of Cleveland, O. 291,636
An annular field-magnet having two consequent-poles with their faces concentric with the centre of the ring; and two H armatures upon a common shaft, but with their poles at right angles; with a switch for running the armature shaft in either direction.

**Escapement and Unison Mechanism for Printing-Telegraphs**; Stephen D. Field, of New York, N. Y., assignor to the Commercial Telegram Co., of same place..... 291,705
A modified polarized relay magnet, by which greater speed is gained in moving the escapement mechanism of printers.

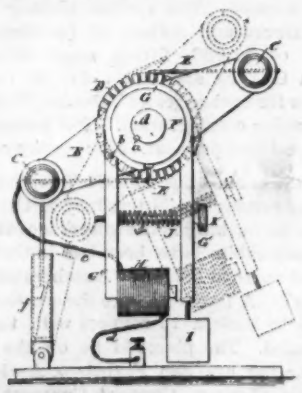
**Electrical Indicator and Alarm**; William H. Baker, of Brooklyn, New York.....291, 484, 291, 483
These provide means whereby a closing of the circuit at any one of a series of stations is indicated at a central station, and located by a number shown upon a dial. It finds its use in burglar alarms or as an annunciator.

**Electric Safety Cut-Out**; Charles J. Van Depoele, of Chicago, Ill..... 291,649
This cut-out is made effective by the use of an induced current from a coil wound parallel with the shunt of high resistance of a differential system. A contact-lever is released to close the circuit by the attraction of an electro-magnet in the circuit of the induced current; or by the thermal expansion of a fine wire in this circuit.

**Electric Lamp**; Charles J. Van Depoele, of Chicago, Ill..... 291,651
In this differential-lamp the high-resistance shunt-magnet has two high resistance circuits, parallel and independent. One of these is constantly closed, and the other is continually and rapidly opened and closed by the action of a vibrator.

**Electric Arc Lamp**; Charles J. Van Depoele, of Chicago, Ill..... 291,653
Various combinations of "certain novel details of construction and arrangement."

**Regulator for Dynamo or Magneto-Electric Machines**; Forée Bain, of Chicago, Ill., assignor to the Bain Electric Co., of same place..... 291,566



The shaft *A* has a friction-pulley *F* keyed to it at *a*. In a groove in the pulley the iron strap *G*, with arms *G'* and *G''*, lies. The screw *K* and the spring *J* serve to adjust the friction of the strap upon the pulley. The arm *G* has an extension at right angles which carries the magnet coil *H*. The strap is attached to the brush-yoke *B* so that the two move together. The weight *I* tends to keep the strap-arms vertical. The movement of the pulley during the running of the machine tends to carry the strap, yoke, and weight forward into the position shown by the dotted lines. This movement places the brushes on the collector so as to decrease the current. Current from the main circuit flows through the magnet coils *H*, and the magnetism due to this tends to increase the clamping force of the strap, the friction on the pulley, the deflection of the arms and the forward movement of the brushes to decrease the current. A desired equilibrium of these opposed forces is obtained by adjusting the weight *I*, or by the use of a spring in place of the weight.

**Electric Arc Lamp**; C. J. Van Depoele, of Chicago, Ill..... 291,553
This lamp has its carbons moved by a rotatory electric motor; and its special feature is the means by which the carbons are moved into contact when they are apart at beginning of flow of current

**Hydraulic and Electric Interlocking Apparatus**; Oscar Gassett, of Boston, Mass., assignor, by mesne assignments, to Robert Pitcairn and George H. Christy, Trustees, of Pittsburgh, Pa. Original number 266,957, dated Oct. 31, 1882. Reissue Nos.....10,434 and 10,435
For railway block and signal service.

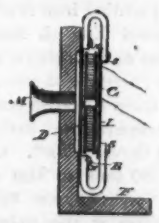
**Insulating Connection for Electric-Light Fixtures**; Charles H. Hinds, of New York, N. Y..... 291,731
Insulates the fixtures from the gas-pipes to which they are attached.

**Magneto-Electric Railway Signal**; Wesley W. Gary, of Boston, Mass..... 291,590

**Railway-Signal System**; William Hadden, of Brooklyn, N. Y..... 291,721
The signals are operated on a closed circuit, and worked from either end of the section automatically.

**Receiving Telephone**; Lyman W. Sutton, Jr., of Newton, assignor to John F. Phillips, of Jersey City, N. J..... 291, 802
Consists of the combination of a resonant magnetic tube, open at both ends, a magnet and a helix, all in inductive relation to each other.

**Telephone**; Joseph H. Cheever, of Somerville, Mass. 291,684
The iron diaphragm *D* is fastened to the north poles *N* of



a number of permanent horseshoe magnets *B* placed radially around its periphery. A like diaphragm *C* is fastened to the other poles *S* of the magnets. A bobbin *I* of the wire in the line circuit is sustained between the diaphragms. One diaphragm forms a common north-pole piece and the other a common south pole piece for the several magnets.

**Safety Cut-out for Series of Electric Lamps**; Charles J. Van Depoele, of Chicago, Ill..... 291,652
Under this arrangement when the carbons of an arc lamp are not in contact a shunt around the lamp is closed so that the others of the series can burn. But if the carbons come in contact the shunt is at once opened, and the current takes its proper course through the carbons, all without disturbing the other lamps.

**Storage Battery**; Edward R. Knowles, of Brooklyn, N. Y., assignor of one-half to Byron A. Brooks, of same place..... 291,850
The positive electrodes are constructed of piles composed of alternate plates or discs of lead and compressed sponge-lead; and the negative electrodes are similarly made of lead and oxide of lead.

**Secondary Battery**; Eusebius J. Molera and John C. Cebrian, of San Francisco, Cal.; said Molera assignor to said Cebrian..... 291, 526
The plates of this cell are made of a mixture of carbon and lead compressed into desired form, with a layer of active material applied to their surfaces.

**Underground Electrical Conductor**; John Greives and John H. Bleoo, of Paterson, N. J. ..... 291,715